Remarks

Reconsideration of this patent application is respectfully requested, particularly as herein amended.

The Office Action of October 13, 2006, first objects to the drawings under 37 C.F.R. §1.83(a) because the drawings do not show the "measuring system" formerly recited at lines 5 and 6 of claim 1 and at lines 4 and 5 of claim 4, and currently recited at lines 5 and 6 of claim 6 and at lines 2 and 3 of claim 11. In reply, and responsive to the requirements of 37 C.F.R. §1.121(d), a single "Replacement Sheet" of drawings is enclosed with this Reply which shows a "Position Measuring System (M)" in Figure 1, corresponding to structure disclosed at lines 23 to 27 of page 4 of the specification, as originally submitted. Entry of the enclosed Replacement Sheet of drawings is respectfully requested, overcoming the stated objection to the drawings under 37 C.F.R. §1.83(a).

In addition, although not required by the issued Office Action, a substitute specification has been submitted for this patent application. The substitute specification includes amendments which have been made to insert a reference "(M)" to the "Position Measuring System" shown in Figure 1 of the drawings, at line 22 of page 5, to provide appropriate section headings and to make grammatical corrections resulting from translation of the original specification from French into English.

A marked-up copy of the original specification showing the changes which have been made in the substitute specification has also been enclosed, on separate pages, in accordance with the requirements of 37 C.F.R. §1.125(c). The substitute specification includes no new matter, and the entry of the enclosed substitute specification is therefore respectfully requested in accordance with 37 C.F.R. §1.125(b).

An amended Abstract has also been submitted for this patent application. The amended Abstract has been reproduced on a separate sheet enclosed with this Reply, in accordance with the requirements of 37 C.F.R. §1.72(b), and the entry of the amended Abstract is therefore respectfully requested.

Claim 5 is next objected to under 37 C.F.R. §1.75(c) as being in improper multiple dependent form. Applicants' claims 1 to 5 have been canceled and replaced with claims 6 to 12, none of which are currently in multiple dependent form. It is submitted that this operates to overcome the stated objection to claim 5 under 37 C.F.R. §1.75(c), and to otherwise comply with the requirements of 35 U.S.C. §112, second paragraph. In the event that any additional issues are identified which may require further consideration, the Examiner is invited to telephone the undersigned to discuss and resolve such issues.

Finally, claims 1 to 4 are rejected under 35 U.S.C. §103(a) as being unpatentable over a U.S. Patent to Kammleiter et al. (No. 4,895,454). Although applicants' claims 1 to 5 have

been canceled and replaced with claims 6 to 12, as previously indicated, independent claim 6 substantially corresponds to original, independent claim 1. It is, nevertheless, submitted that applicants' claims are not properly subject to rejection over the cited patent to Kammleiter et al.

Kammleiter et al. disclose a coordinate measuring apparatus (Col. 3, line 22) used in a flexible manufacturing system (Col. 1, lines 66 to 68), which operates in combination with a temperature sensor 117 to determining the temperature of a workpiece (Col. 3, lines 33 to 41) for purposes of matching a manufactured article to a reference standard against which it is to be measured (Col. 1, lines 14 to 31). The disclosed apparatus is a stand-alone device providing three-dimensional movements of a sensing head 103. However, while there is displacement of the sensing head 103 in the directions x, y and z, the displacements are performed in conjunction with measurements of the workpiece, and not the machinery which is used to manufacture the workpiece.

Consequently, the stated purpose of Kammleiter et al. is to compensate for temperature variations in a workpiece during measurement of the workpiece relative to a reference standard. This is to be distinguished from the purpose of the present invention, which is to automatically measure the dimensions of the tools of a machine tool for manufacturing a workpiece. Accordingly, it is submitted that the purpose of Kammleiter et al. is entirely different from the purpose of applicants' claimed

measuring device and that Kammleiter et al. is, therefore, not properly cited again applicants' claims under 35 U.S.C. §103(a).

Moreover, even if the citation of Kammleiter et al. is considered to be appropriate, there are fundamental differences between the coordinate measuring apparatus of Kammleiter et al. and the subject matter recited in applicants' claims.

For example, the automatic measuring device recited in applicants' claims is not a stand-alone device, but rather forms part of the machine tool with which it is associated. There is no suggestion in Kammleiter et al. that the disclosed coordinate measuring apparatus could be combined with a machine tool, or how this could possibly be accomplished.

In addition, applicants' automatic measuring device includes a plate which cooperates with a flexible bar such that contact with the tool operates to deform the flexible bar, releasing an end of the bar from a cooperating detector in order to deduce a dimension of the tool. As is acknowledged in the Office Action, at the bottom of page 3, Kammleiter et al. do not disclose a bar made of a flexible material. Clearly then, Kammleiter et al. also do not disclose a bar which is flexible, or how to employ a flexible bar for purposes of measuring the dimensions of a tool.

It is noted that from the bottom of page 3 of the Office Action, over to page 4, the statement is made that the "particular type of material used to make the bar, absent any

criticality, is only considered to be [an obvious] selection of a material [suitable] for [an] intended use". This position is respectfully traversed, and a reconsideration and withdrawal of this stated position is respectfully requested for reasons which follow.

Firstly, applicants' claims are not merely directed to a bar made of a flexible material, but rather are directed to a flexible bar which is associated with the claimed apparatus so that movement of the bar operates to measure desired dimensions. Consequently, this is not merely a recitation of the preferred material for forming the bar, but rather is a recitation of structural interaction between the bar and the remainder of the claimed apparatus.

Secondly, there is no indication whatsoever that the machine base 101 of Kammleiter et al., which the Office Action equates with the flexible bar recited in applicants' claims, could be flexible, or that the apparatus of Kammleiter et al. would be able to function with a flexible machine base 101.

Thirdly, there is no indication whatsoever how the machine base 101 of Kammleiter et al., or any other structure of Kammleiter et al., even if made flexible, could interact with the sensing head 103 to achieve a measurement of dimensions in accordance with applicants' claims.

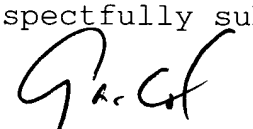
Consequently, the criticality of using a flexible bar, in accordance with applicants' claims, has been shown, contrary

to the position stated in the Office Action.

In view of the foregoing, it is submitted that this patent application is in condition for allowance and corresponding action is earnestly solicited.

As a final matter, applicants further enclose an "Information Disclosure Statement" which is being submitted to inform the Patent Office of information cited in an Office Action issued by the Patent Office in connection with co-filed U.S. Patent Application No. 10/550,780, which had been brought to the attention of the Patent Office in applicant's Information Disclosure Statement filed March 30, 2006. Because the enclosed Information Disclosure Statement is being filed after the mailing of a first Office Action on the merits, consideration of the enclosed Information Disclosure Statement is respectfully requested pursuant to 37 C.F.R. §1.97(c). The fee set forth in 37 C.F.R. §1.17(p) is submitted herewith.

Respectfully submitted,



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BACKGROUND OF THE INVENTION

The present invention relates to an automatic measuring device for measuring the dimensions of a tool for a machine tool.

Resulting from the availability ~~Thanks to the presence~~ of a magazine including ~~comprising~~ all of the tools necessary for the machining of a workpiece, fully automated machine tools can be used ~~fully automatically~~ to carry out the machining of a workpiece, such as, for example, a kitchen or bathroom ~~worktop.~~

~~However~~ worktop. However, in order to automatically sequence all of the machining operations ~~automatically~~, the machine tool must [[has]] first [[to]] measure and store the exact dimensions of all of the tools stored in its magazine.

Devices are ~~already~~ known for allowing ~~in the prior art that allow~~ such [[an]] automatic measurement of the dimensions of each tool [[in]] which is to be fitted on the machine spindle of the machine tool. To this end, the machine spindle, fitted with a tool, is caused [[comes]] to interact with a [[the]] device arranged on the machine tool in order to deduce, depending on a [[its]] measurement system specific to the [[its]] spindle, the dimensions of the tool.

For example, one such device includes ~~One of these devices consists, for example, of~~ two separate feelers ~~tracers~~, ~~respectively~~ one of which is axially oriented and one of which is radially oriented. The [[, the]] machine, with the tool to be measured in its spindle, first ~~comes to~~ rests the bottom face of the tool on the axial feeler, ~~tracer~~ to measure its length, and then ~~secondly~~ rests the outer face on the [[its]] radial feeler, ~~tracer~~ to measure its ~~diameter.~~

~~Such~~ diameter. Such a measurement device, although accurate, is extremely costly and sensitive to impacts. Furthermore, such a measurement device [[it]] needs to be situated in a protected location, and needs to be sheltered from machining spray.

Another known device includes ~~consists in arranging~~ a laser beam arranged on the machine. The machine determines and stores ~~memorizes~~ the dimensions of the tool when the tool ~~latter~~ cuts the laser beam with the bottom face or the [[its]] outer face of the tool, corresponding respectively to a [[the]] determination of the length and the diameter of the ~~tool.~~

~~The~~ tool. The major disadvantage of such a device is ~~lies in the fact~~ that it is unsuitable for working stone, of which kitchen tops are made, for example, because of the water and mud

spray which can [[may]] divert or obstruct the laser beam.

The object of the present invention is to provide ~~propose~~ an automatic measuring device for measuring the dimensions of a tool which remedies some or all of the aforementioned disadvantages.

SUMMARY OF THE INVENTION

The ~~Accordingly, the subject of the~~ present invention relates to [[is]] an automatic measuring device for measuring the dimensions of a tool for a machine tool. The machine tool includes ~~comprising~~ a spindle for receiving the [[a]] tool which is capable of being moved in order to interact with a [[the]] device for deducing ~~in order to deduce~~, according to a measuring system specific to the [[said]] spindle, the dimensions of the tool.

In accordance with the present invention, the device for deducing the dimensions of the tool includes ~~characterized in that it consists of~~ a bar made of a material having highly elastic properties. One end of the bar [[,]] ~~one of these ends of which~~ is fixedly attached to a first yoke attached to a fixed frame and an [[its]] opposite, free end of the bar is in contact with two detectors placed perpendicular to one another and to a second yoke which is capable of sliding on the flexible bar. A ~~that is overhung by a~~ platform on which the [[said]] tool to be

measured is capable of resting overhangs the second yoke.

The ~~According to some worthwhile provisions of the invention:~~

[[- the]] bar is advantageously made of an elastic steel and has a square ~~cross section,~~

[[- the]] cross-section. The detectors are advantageously micrometric end-of-travel detectors (having a high degree of protection against external attack), one of which is placed vertically in order to determine the length of the tool and the other which is placed horizontally in order to determine the ~~diameter,~~

[[- each]] diameter of the tool. Each of the detectors is advantageously connected to a measuring system specific to the positions of the spindle, in this way [[thus]] making it possible to deduce the dimensions of the tool [[,]] when the detectors [[they]] break contact with the ~~bar, to deduce the dimensions of the tool,~~

[[- the]] bar. The platform is advantageously provided with a beveled edge.

These and other ~~aforementioned~~ features of the present invention [[,]] ~~and others,~~ will become apparent from ~~emerge more clearly on reading~~ the ~~following~~ description of an exemplary

embodiment which is provided below, with reference to the following ~~appended~~ drawings. ~~in which:~~

BRIEF DESCRIPTION OF THE DRAWINGS

[[-]] Figure ~~figure~~ 1 is a ~~view in~~ perspective view of an automatic measuring device for measuring the dimensions of a tool for a machine tool in accordance with ~~according to~~ the present invention. [[,]]

[[-]] Figures ~~figures~~ 2 and 3 are elevational views respectively taken along the arrows F1 and F2 of Figure ~~figure~~ 1, illustrating the measurement of the length of a tool. [[, and]]

[[-]] Figures ~~figures~~ 4 and 5 are elevational views similar to Figures ~~figures~~ 2 and 3, illustrating the machine ~~cutting~~ tool in a position in which ~~whereby~~ the measuring device can deduce the diameter of the ~~a~~ ~~cutting~~ tool.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Figures 1 to 5 show an automatic measuring device 1, particularly a digitally controlled device for measuring the dimensions of a cutting tool 2 for a machine tool. The measuring device 1 is preferably [[,]] ~~particularly numerically controlled,~~

~~intended to be~~ positioned, as an [[for]] example, on the side of the machine's tool magazine.

In accordance with ~~According to~~ the present invention, the [[this]] measuring device 1 includes ~~consists of~~ a bar 3 made of a material having highly elastic properties. One end of the bar 3 [[,]] ~~one of these ends of which~~ is fixedly attached to a yoke 4, which is in turn attached to a fixed frame 5. An ~~and its~~ opposite, free end of the bar 3 is in contact with two detectors 6 and 7 placed perpendicular to one another and a yoke 8 capable of sliding on the flexible bar 3. A ~~that is overhung by a~~ platform 9 overhangs the yoke 8 so that ~~on which~~ the tool 2 to be measured, which is ~~capable of resting,~~ mounted on a spindle 10 of the machine ~~tool.~~

~~The~~ tool, is capable of resting on the platform 9. The bar 3 is advantageously made of an elastic steel and has a square cross-section, allowing [[a]] good contact with the detectors 6 and 7, as explained below.

In ~~According to~~ a preferred embodiment, the platform 9 is provided with a beveled edge 11, as is best shown ~~(as can be seen~~ in Figures ~~figures~~ 2 and 4, ~~) in order~~ to ensure an appropriate measurement of [[the]] diameter for tools 2 having various shapes, such as, for example, the [[an]] external concave

profile shown in Figures ~~(figures~~ 4 and 5 [[)]].

The ~~It should also be noted that the~~ detectors 6 and 7 are advantageously micrometric end-of-travel detectors, one of which (the detector 6) is placed vertically in order to determine the length of a tool, and the other (the detector 7) which is placed horizontally in order to determine the diameter of the tool, as will be explained in greater detail below ~~in the rest of the description~~. As is shown in Figures 2 and 4, the [[These]] detectors 6 and 7 are attached [[,]] ~~as shown in figures 2 and 4,~~ to a flange 12 that is generally L-shaped, and which is [[made]] fixedly attached to the frame 5 ~~in order~~ to ensure [[a]] contact with the bar 3 only at ~~their ends.~~

~~Each~~ the ends of the detectors. Each of the [[these]] detectors 6 and 7 is suitably connected to a conventional ~~specific~~ system (M ~~not shown~~) for measuring [[the]] positions of the spindle 10, in this way [[thus]] making it possible [[,]] ~~when they break contact with the bar 3,~~ to deduce the dimensions of the tool 2 when the detectors 6 and 7 break contact with the bar 3.

It can be easily understood that in order to measure the length of a tool 2, it is sufficient for the machine, having the ~~furnished with a~~ tool in its spindle 10, to cause ~~come and rest~~

the bottom face of the tool 2 to rest on the top face of the platform 9 of the yoke 8. This then causes ~~thus causing~~ the bar 3 to flex, which releases the vertical end-of-travel detector 6 in order to deduce [[,]] ~~according to the reference positions of the spindle 10,~~ and register the length of the ~~tool 2.~~

~~In a~~ tool 2 according to the reference positions of the spindle 10. In similar manner, the external diameter of the [[a]] tool 2 is measured by placing the outside of the tool 2 in contact with the bevel 11 of the platform 9, causing a lateral flexing of the bar 3 and releasing the horizontal end-of-travel detector 7 in order to deduce the diameter of the tool 2.

It will be noted that the precision of the measurement can [[may]] be optimized by moving the movable yoke 8 associated ~~provided~~ with the platform 9, and distancing the movable yoke 8 [[it]] as far as possible from the free end of the bar 3, where the detectors 6 and 7 are situated. The ~~Thus, the~~ greater the amplitude of the bar 3, the more precise the measurement.

The ~~Such an~~ automatic measuring device 1 has the following ~~advantages:~~

~~1/ is~~ advantages. The measuring device is not fragile, unlike ~~the solutions of the~~ prior measuring devices, [[art]] and [[also]] operates irrespective of the environment (i.e.,

that is wet or ~~dusty,~~

~~2/ is~~ dusty). The measuring device is economical to purchase and ~~maintain,~~

~~3/ is~~ maintain, and is reliable due to the simplicity of its design and the components ~~used.~~

~~Furthermore~~ used. Furthermore, in the event of an error by the operator or the machine, only the bar can be damaged, which [[. This]] is easily and rapidly replaceable, and at less cost.

Although the present invention has been described with reference to a particular embodiment, it is to be understood that the present invention covers all of the technical equivalents of the methods described.